

Aircraft Certification Service
Small Airplane Directorate
DESIGNEE NEWSLETTER



Spring 2001



Lancair Columbia 300

Lancair Columbia 300 over Smith Rock State Park
(Lancair's Web Site)

The Columbia 300 is a four-passenger, single-engine airplane with a takeoff weight of 3,400 pounds. The Lancair Columbia 300 flies at 220 miles per hour and has been certified to fly up to 18,000 feet MSL. On January 11, 2001, NASA accepted delivery of a Columbia 300 to evaluate technologies being developed for the Advanced General Aviation Transport Experiments (AGATE) program and the Small Aircraft Transportation System program.

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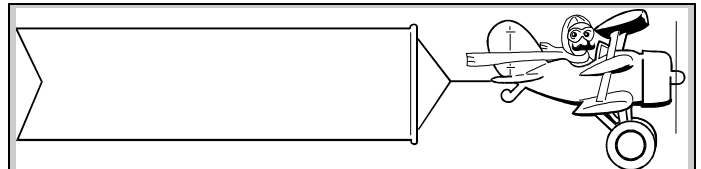
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Editors Note: Thanks to everyone who helped with the development of this newsletter. In order to be effective, the newsletter must serve all of our needs. To ensure yours are being served, we need to make the newsletter available to you. Future editions will be available electronically on the Small Airplane Directorate web site. However, please continue to let your managing office know of any changes in your mailing address.



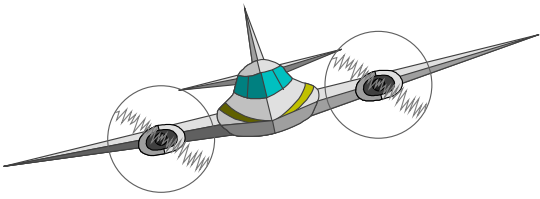
We would like photographs and artwork for future issues of the Designee Newsletter. Please send your comments on this issue, as well as ideas, suggestions, photographs, and artwork for future issues to the address listed on this page, or you may e-mail us at:

sonya.anderson@faa.gov or
pat.nininger@faa.gov

Be sure to obtain permission, if necessary, and submit to us any artwork and photographs.

We welcome your ideas, suggestions, articles and artwork for future issues of this newsletter.

The Editor



This is the Spring 2001 edition of the Small Airplane Directorate's *Designee Newsletter*.

INSIDE THE FAA

FROM THE DIRECTORATE MANAGER'S OFFICE

It has been a while since we sent out a Designee Newsletter, and it is good to do it again. Resource limitations had prevented us from producing the newsletter, though that situation is improved. We can now get back to providing you, our partners in safety, with information that is helpful and adds value.

For the most part, this issue is about catching up. A good amount of policy has been issued over the past couple of years and we want to make sure you are aware of it. The directorate has also embarked on a number of initiatives that will provide you the opportunity to help us shape future policy and guidance.

1. The directorate now publishes draft policy in the Federal Register, seeking public comment on its potential impact and suggestions for better ways of accomplishing the task.
2. Working with industry, the directorate published a supplement to the Airworthiness Directives Manual. This supplement includes a process for working with the various "Type Clubs" on safety issues prior to initiating an Airworthiness Directive, thus getting a reality check on the implications of an AD and suggestions on how to better resolve the safety issue. You may obtain a copy of the Airworthiness Directives Manual on our web site at:
<http://www.faa.gov/avr/air/ace/acehome.htm>.

In another effort to provide you the tools you need to better accomplish your role as a representative of the Administrator, the Designee Training Team (DTT), developed a number of training tools for your use.

1. A 3-day "Part 21 for Designees" training course was prototyped last December in Atlanta and will be provided in three other locations this year. Look for details on the designee web site.
2. On the web site is a list of all the videos used in our various FAA training courses that can be purchased for a minimal fee.
3. Finally, we recently completed a short (30 minute) video discussing the roles and responsibilities of designees and the companies that utilize them. This video can be used by you to help upper managers in your organization to understand their roles and yours in the designee process. The Aircraft Certification Offices and Manufacturing Inspection District Offices have the video available for review. You may purchase the video from OPI in Enid, Oklahoma by telephone at 800-443-3827 or email at vincent@opi2001.com. Information on this product will soon be on the designee web site.

Over the next couple of issues, we will continue to catch you up on various policy and designee issues that affect you. Take care and have a great Spring (if we ever get out of Winter).

Mike Gallagher

National Resource Specialists

AIRCRAFT CERTIFICATION SERVICE

NATIONAL RESOURCE SPECIALISTS

As of December 2000

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Designee Newsletter

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Current information is available on the following web site:

NRS Home Page: <http://www.faa.gov/avr/air/air100/nrshome.htm>

Seminars



2001 Meeting Schedule

Designee Seminars

Engine and Propeller Directorate

The Engine and Propeller Directorate, New York Aircraft Certification Office, will host a DER Standardization Seminar on March 27-28, 2001, in Philadelphia, Pennsylvania and a DER Recurrent Seminar on May 2-4, 2001, also in Philadelphia. The Directorate hopes to hold future Standardization Seminars and Recurrent Seminars at the same time every year with locations to be determined. Recurrent Seminar topics will alternate, one year focusing on airplanes and the next year focusing on engines. This year the Recurrent Seminar will focus on airplanes.

Wichita Aircraft Certification Office (ACO)

On April 24-25, 2001, the Wichita ACO will hold a designee conference for DOA, DAS, and SFAR-36 Airworthiness Representatives (AR's) at the Wichita Airport Hilton.

Los Angeles Aircraft Certification Office (ACO)

Date	Session
May 8-10, 2001	Recurrent Seminar (Airframe/Propulsion):
May 8, 2001	Propulsion Breakout Session
May 9, 2001	General Session
May 10, 2001	Airframe and Acoustic separate Breakout Sessions
July 18-19, 2001	Standardization Seminar
September 25-27, 2001	Recurrent Seminar (Systems/Flight Test)

All seminars take place at the Golden Sails Best Western, in Long Beach, California.

Contact Bob Stacho, ANM-130L, 562-627-5334, if you have any questions.

Seattle Aircraft Certification Office (ACO)

The Seattle ACO has set a tentative schedule for Recurrent General and Breakout sessions for Boeing DER's for July 24-25, 2001, and a Standardization Seminar for new DER's for August 8-9, 2001.

Southwest Region

The Airplane Certification Office, ASW-150, will host a Designee Conference for the Southwest Region on July 25-26, 2001, at the Harvey Hotel in Irving, Texas.

Atlanta Aircraft Certification Office (ACO)

The Atlanta ACO plans to host a Designee Conference in Atlanta, Georgia on June 26-27, 2001. For more information, contact Kaye Henson, 770-703-6047.

Software Standardization Conference

A software standardization conference will be conducted in Danvers, Massachusetts, June 5-8, 2001. Contact Leanna Rierson, National Resource Specialist for Software, or Ken Filippelli of AFS-610, 405-954-1825, for further information. The conference is tentatively scheduled to be held at the Sheraton Ferncroft. Information can be found on the FAA's Software Web site: <http://av-info.faa.gov/software>.

Chicago Aircraft Certification Office (ACO)

The Chicago ACO plans to host a Standardization Seminar in Chicago, Illinois on June 12-13, 2001. For more information, contact Ivory Wright, 847-294-7425.

Seminars at a Glance

DATE	TYPE	LOCATION	HOTEL	ACO
MARCH 27-28, 2001	STANDARD	Philadelphia, PA	Holiday Inn Independence Mall 215-923-8660	ANE-170 (BOSTON)
APRIL 11, 2001	RECURRENT	Denver, CO	Denver Stapleton Hotel 303-333-7711	ANM-100D
APRIL 24-25, 2001		Wichita, KS	Wichita Airport Hilton	ACE-115W (WICHITA)
MAY 2-4, 2001	RECURRENT (SUBJECT: AIRPLANES)	Philadelphia, PA	Holiday Inn Independence Mall 215-923-8660	ANE-170 (BOSTON)
MAY 8-10, 2001	RECURRENT	Long Beach, CA	Best Western Golden Sails 582-596-1631 800-762-5333	ANM-130L
JUNE 5-8, 2001	SOFTWARE	Boston, MA	Sheraton Ferncroft Danvers, MA 978-777-2500	AIR-130 (AVIONICS BRANCH)
JUNE 12-13, 2001	STANDARD	Chicago, IL	Indian Lakes Resort 250 W. Schick Road Bloomington, IL. 60108 630-529-0200 800-334-3417	ACE-116C
JUNE 26-27, 2001	RECURRENT	Atlanta, GA	Airport Marriott 404-766-7900	ACE-115A (ATLANTA)
JULY 18-19, 2001	STANDARD	Long Beach, CA	Best Western Golden Sails 562-596-1631 800-762-5333	ANM-130L
JULY 24-25, 2001	RECURRENT (Boeing DERs)	Seattle, WA	Boeing Longacres Facility	ANM-100S
JULY 25-26, 2001	ASW Annual Designee Conference	Fort Worth, TX (Irving)	Harvey Hotel (North end of DFW)	ASW-150
AUGUST 8-9, 2001	STANDARD	Seattle, WA	Doubletree Inn at Southcenter 206-246-8220	ANM-100S
SEPT. 25-27, 2001	RECURRENT	Long Beach, CA	Best Western Golden Sails 562-596-1631 800-762-5333	ANM-130L

Current information for seminars is also available at <http://av-info.faa.gov/dst>.

Designated Engineering Representative (DER) Seminar on International Issues

Contributed by AIR-4, International Airworthiness Programs

On January 24-25, the FAA conducted a seminar in Long Beach, California for currently active international designees. The seminar addressed a variety of topics pertaining to the roles and responsibilities of the designees in the international domain.

The seminar's purpose was to clarify the responsibilities the FAA has entrusted to designees while working internationally on behalf of the FAA. The seminar topics included comprehensive presentations on the FAA's perspective on today's global regulatory challenges, the DER's role in the global environment, the role of Designees involved with FAA/JAA Type Validation, and an understanding of how DER's can be delegated authority to make findings to foreign regulations. These presentations included case study scenarios requiring audience participation. An additional feature of the seminar was a JAA overview presentation by the Assistant to the JAA Regulation Director.

The high level of interest in the subjects being briefed was evident by the numerous questions that were asked during the presentations and spilling over into the break periods between the presentations. Of particular interest to the DER's were the presentations that outlined pending FAA policy/order changes affecting the DER community. DER's who work internationally should be aware that foreign-registered aircraft are the responsibility of the State of Registry, not the FAA or its designees. The FAA is developing a policy statement of when designee activity is appropriate, particularly in the repair environment.

At the conclusion of the second day, an open forum offered the audience an additional opportunity to ask any lingering questions as well as provide a critique of the seminar. Almost half of those who attended the seminar submitted written critique sheets. The consensus of the comments acknowledged the value of conducting this type of seminar. Suggestions were offered that these materials be incorporated into similar future seminars. Since most of the attendees/respondents were consultant DER's, they requested that future offerings should focus more on the DER's international role, STC activities, foreign registered aircraft issues, and FAA's delegation of findings and less on TVP, JAA organization, and FAA/JAA harmonization topics.

The FAA may offer this seminar again in Fall 2001. In the interim, a summary module, taken from this seminar, will be included as part of recurring DER training seminars. The seminar presentation materials can be viewed at [//av-info.faa.gov/dst/international.pdf](http://av-info.faa.gov/dst/international.pdf) on the training page.

Newsletter and Directorate Information

Electronic Age

This issue of the newsletter will be published electronically on our Small Airplane Directorate web site. To reach the web site, go to www.faa.gov, select FAA organizations, Aircraft Certification, Small Airplane Directorate. Designees will be notified of the publication of the newsletter by mail. Future newsletters will appear on the web site as they are completed.

New Phone Directory

A new phone directory for the Small Airplane Directorate is published in this edition. (See pages 35 to 53.)



Other Directorates

Interested in contacting other Directorates? Following are the addresses for each of the other Directorates:

Transport Airplane Directorate

Federal Aviation Administration
Transport Airplane Directorate, ANM-100
1601 Lind Avenue, S.W.
Renton, Washington 98055-4056

Rotorcraft Directorate

Federal Aviation Administration
Rotorcraft Directorate, ASW-100
2601 Meacham Boulevard
Fort Worth, TX 76137-4298

Engine and Propeller Directorate

Federal Aviation Administration
Engine and Propeller Directorate, ANE-100
12 New England Executive Park
Burlington, MA 01803-5299

POLICY & GUIDANCE

ADVISORY CIRCULARS (AC's)

Equipment, Systems, and Installations in Part 23 Airplanes

Since our last newsletter, the Small Airplane Directorate has issued several advisory circulars. On March 12, 1999, the directorate issued AC 23-1309-1C. The AC provides guidance and information for an acceptable means, but not the only means, for showing compliance with the requirements of § 23.1309(a) and (b) (Amendment 23-49) for equipment, systems, and installations in Title 14 Code of Federal Regulations (14 CFR) Part 23 airplanes. The primary objective of the revision to the AC is to improve the safety of the airplane fleet by fostering the incorporation of both new technologies that address pilot error and weather related accidents and those technologies that can be certificated affordably under 14 CFR Part 23.

An increase in avionics equipage rates and improved pilot situational awareness should have a significant positive impact on the GA accident rate. Enhancing the quantity, quality, and presentation of situational data available to the pilot in the cockpit can improve pilot situational awareness. Many studies have shown that equipping these airplanes with safety devices such as Terrain Awareness Warning Systems and Advanced Weather Display Systems may dramatically reduce

a number of accident types. For GA airplanes, the cost of such devices currently is prohibitive. The cost of certifying these systems in airplanes is an added layer to the recurring cost per part and per installation. Lower equipage rates associated with increased costs impede safety benefits.

Certification of Part 23 Airplanes for Flight in Icing Conditions

The Small Airplane Directorate also issued Advisory Circular (AC) 23-1419-2A, on August 19, 1998, since our last newsletter. The AC sets forth an acceptable means, but not the only means, of demonstrating compliance with the ice protection requirements in Title 14 of the Code of Federal Regulations (14 CFR) Part 23. The Federal Aviation Administration (FAA) will consider other methods of demonstrating compliance that an applicant may elect to present.

The guidance provided in the AC applies to ice protection systems approval for operating in the icing environment defined by 14 CFR Part 25, Appendix C. The guidance should be applied to new Type Certificates (TC's), Supplemental Type Certificates (STC's), and amendments to existing TC's for airplanes under Part 3 of the Civil Aviation Regulations (CAR) and Part 23, for which approval under the provisions of § 23.1419 is desired.

Powerplant Guide for Certification of Part 23 Airplanes

On September 21, 1999, the Small Airplane Directorate issued Advisory Circular (AC) 23-16. AC 23-16 provides information and guidance concerning acceptable means, but not the only means, of showing compliance with Title 14 of the Code of Federal Regulations (14 CFR) Part 23, Subpart E, applicable to the powerplant installation in normal, utility, acrobatic, and commuter category airplanes. The AC consolidates existing policy documents, and certain AC's that cover specific paragraphs of the regulations, into a single document.

The AC is current through Amendment 23-51, effective March 11, 1996. Material spans approximately 30 years of Federal Aviation Administration (FAA) and Civil Aviation Authority (CAA) aviation history.

Installation of Electronic Displays in Part 23 Airplanes

On March 12, 1999, the Small Airplane Directorate issued Advisory Circular (AC) 23.1311-1A. This AC provides an acceptable means, but not the only means, of showing compliance with Title 14 of the Code of Federal Regulations (14 CFR) applicable to the installation of electronic displays in Part 23 airplanes.

Systems and Equipment Guide for Certification of Part 23 Airplanes

The Small Airplane Directorate issued Advisory Circular (AC) 23-17 on April 25, 2000. The AC sets forth an acceptable means, but not the only means, of showing compliance with Title 14 Code of Federal Regulations (14 CFR) Part 23, for the certification of systems and equipment in normal, utility, acrobatic, and commuter category airplanes. AC 23-17 applies to Subpart D from § 23.671 and Subpart F. It consolidates existing policy documents, and certain AC's that cover specific paragraphs of the regulations, into a single document.

Installation of Terrain Awareness and Warning System (TAWS) Approved for Part 23 Airplanes

On June 14, 2000, the Small Airplane Directorate issued Advisory Circular (AC) 23-18. The AC establishes an acceptable means, but not the only means, of obtaining Federal Aviation Administration's (FAA) airworthiness approval for the installation of a TAWS that has been approved under Technical Standard Order (TSO)-C151a, Terrain Awareness and Warning System, in a Part 23 airplane. The FAA's TSO process is a means for obtaining FAA design and performance approval for an appliance, system, or product; however, the TSO does not provide installation approval. The AC provides guidance for designing an

acceptable installation for a TAWS that complies with TSO-C151a. The guidance is specific to installations of these systems on airplanes certificated under Title 14 of the Code of Federal Regulations (14 CFR) Part 23 [commonly referred to as Part 23 of the Federal Aviation Regulations (FAR)]. It describes the airworthiness considerations for such installations as they apply to the unique features of the TAWS and the interface of the TAWS with other systems on the airplane.

Equipment that does not meet the minimum performance standards specified in TSO-C151a shall not be identified as TAWS equipment. Applicants that are not required to install TAWS and choose to install the system may deviate from the guidelines in the AC as necessary, provided the level of safety for the airplane's existing certification basis is not degraded.

Installation, Inspection, and Maintenance of Controls for General Aviation Reciprocating Aircraft Engines

On June 6, 2000, the Small Airplane Directorate issued Advisory Circular (AC) 20-143. The AC covers engine control installations and maintenance. Most airplane or engine maintenance manuals lacked detailed information on inspection and installation of engine controls. The new AC presents information on inspection, maintenance, and installation of engine controls with an emphasis on the airframe portion of these systems. The AC will supplement, not replace, the procedures in the manufacturers' maintenance manuals. Where the content of the AC differs from or conflicts with the

manufacturer's maintenance manual, instructions in the manufacturer's manual take precedence.

Design rules require throttle and mixture controls on single reciprocating engine airplanes that will allow continued safe flight and landing in the event of a control separation at the engine fuel metering device. Current rules (23.1143(g) and 23.1147(b)) are not applicable to older airplanes. The AC addresses proper installation, inspection, and maintenance of many different types of engine controls on old and new airplanes regardless of the rules under which they were certified. General requirements are contained in Part 43, Appendix D, which specify the scope and detail of items to be included in annual and 100-hour inspections, of which paragraph (d)(6) states, "Engine controls--for defects, improper travel, and improper safetizing." The AC provides expanded guidance for general aviation airplanes equipped with reciprocating engines.

Of course, the material in the AC is neither mandatory nor regulatory in nature and does not constitute a regulation. If anyone wants further information about this AC, a copy of the AC is available on the FAA web site at www.faa.gov, under: Aviation Support and Regulations; Guidance, Reference, Advisory; Index of FAA Advisory Circulars; Aircraft Certification Advisory Circulars.

Regulations

Airworthiness Standards; Bird Ingestion; Amendment 23-54

On September 5, 2000, the Federal Aviation Administration issued Amendment 23-54. The amendment revises Parts 23, 25, and 33 airworthiness standards for aircraft turbine engines.

The National Transportation Safety Board recommended a review of bird ingestion after an accident involving a wide-bodied aircraft. To address the problem, the FAA requested information from industry. The Aerospace Industries Association provided a report to the FAA. Based on this information, the FAA decided to increase the severity of bird ingestion testing.

On September 14, 2000, the new requirement was published in the FEDERAL REGISTER. The amendment revises Sections 23.903, 25.903, and 25.1091. Section 33.76 is added to Part 33.

Traveling?

Although using a toothbrush with toothpaste ensures a cleaner mouth, it may not always be possible to brush after every meal. If you don't have a toothbrush handy, then at least make sure you rinse with water after a meal. The water neutralizes the acids left behind in your mouth and reduces bacteria by 30 percent, according to the Academy of General Dentistry.

--adapted from the *Saturday Evening Post*

From the Aircraft Evaluation Group (AEG)

Master Minimum Equipment Lists (MMEL) and Minimum Equipment Lists (MEL)

The following information was provided by the Long Beach Aircraft Evaluation Group. It concerns approval of Master Minimum Equipment Lists (MMEL) and Minimum Equipment Lists (MEL) through supplemental type certificate data or airplane flight manual supplements. All designees should follow the procedures outlined under Order 8110.4B, Type Certification, and Notice 8110.80, The FAA and Industry Guide to Product Certification.

MMEL Relief in Certification Documents

It has come to our attention that dispatch relief in the form of Master Minimum Equipment Lists (MMEL) and Minimum Equipment Lists (MEL) is being issued as a part of Aircraft Certification FAA approved Supplemental Type Certificate (STC) data information documents or Airplane Flight Manual Supplements (AFMS). These documents are in turn issued to Air Carriers who approach their Principal Operations Inspectors (POI) to place this dispatch relief information into their MEL since it is already FAA approved. This Certification process circumvents the Flight Standards Service MMEL processes.

Background

Recently, a public Flight Operations Evaluation Board (FOEB) meeting was conducted to address changes to the DC-9, MD-80, MD-90, and 717 MMEL's. Air Carriers approached the Board seeking changes to the MMEL. These requests for MMEL changes were based upon FAA approved AFMS STC data issued by Designated Alteration Stations (DAS's) and ACO's. Some MMEL relief appeared in the AFMS and others appeared in the data package. Much of this data was approved by DER's. This AFMS and STC data package relief was in-turn approved by their POI's in the Air Carriers MEL's even though it did not appear in the Master MEL (MMEL). Order 8400.10 requires POI's to allow an Air Carrier MEL relief only if the item appears in the Master MEL. Issuance of dispatch relief in certification documents is inappropriate.

Action

STC issuance which contains MMEL or MEL relief is contrary to Certification Order 8110-4B and Notice N8110.80 FAA & Industry Guide to Product Certification. The Flight Standards Service is in process of making notification to POI's of this procedural error. In addition, the Flight Standards Service hereby requests that the Aircraft Certification Service correct this process error situation with all DER's, DAS's, and ACO personnel.

Signed Eugene F. Huettner

Stress Relief in 20 minutes or Less

Yikes! Your life is getting out of control. The car needs repair, the project at work is overdue, your partner is asking for more togetherness time. Instead of thinking you have to rearrange your life in one fell swoop, take 20 minutes to get a grip on stress:

1. Take a deep breath. Shallow breathing can contribute to stressful feelings. So try this easy exercise: Close off your right nostril and inhale slowly through the left. Hold that breath for a count of five. Then close off your left nostril and exhale out of your right nostril. Do this for about five minutes. Breathing slowly and deeply helps prevent stress from overwhelming you.

2. Reach for protein. When work gets in the way of eating, we tend to reach for quick-fix snacks that are high in caffeine and sugar. Instead, try snacking on foods that are richer in energy-boosting proteins and vitamins like potassium, which becomes depleted when we're stressed. Better alternatives: peanut butter on a banana or whole-wheat crackers.

3. Write it down. Start a journal. Jot down some of your thoughts about what's bothering you, and help yourself put stress into perspective.

4. Get out and walk. Walking just five minutes with your mind concentrated on your stride and rhythmic breathing does wonders to clear your mind. If you can't walk (or don't want to), simply step outside, swing your arms back and forth and breathe deeply for an energy boost.

POLICY

In-Flight Operation of Propellers at Pitch Settings Below the Flight Regime for 14 CFR Part 23/CAR 3 Airplanes

*Policy Statement Number
ACE-00-23.1155-01*

The policy covers certification of normal, utility, acrobatic, and commuter category turbine powered airplanes with propeller beta mode pitch settings. The policy was published in the Federal Register on January 12, 2001 (66 FR 2949) after completing the public comment period.

What Is the General Effect of This Policy?

The policy is a set of guidelines suitable for use. Applicants should expect the certificating officials to consider this information when making findings of compliance. As with all advisory material, this statement of policy identifies one way, but not the only way, of compliance.

A notice of policy statement, request for comments appeared in the Federal Register on September 1, 2000 (65 FR 53340) and the public comment period closed October 2, 2000.

Background

The FAA has taken actions to address previously certificated airplanes with in-

flight beta capability. A fleet wide review of all turbopropeller powered transport, normal, utility, acrobatic, and commuter category airplanes was performed. As a result of the review, the FAA issued Airworthiness Directives that required applicable Flight Manuals to include an operational limitation with consequence statement for in-flight beta operation.

The safety of future type certificated airplanes, with in-flight beta capability, or currently certificated airplanes, which are being modified to add an in-flight beta capability, should also be assessed. This assessment should consider both unintentional and intentional operation of propellers in pitch settings below the flight regime.

The Policy

Inadvertent In-Flight Operation

Regarding inadvertent operation, as previously mentioned, Amendment 23-7 added a requirement (§ 23.1155) that operations of the propeller controls at pitch settings below the flight regime have a means to prevent inadvertent operation. For airplanes with a certification basis before Amendment 23-7 that are modified to add in-flight beta capability, the provisions of § 21.101(b) should be used to evaluate the possible unsafe nature of inadvertent operation of propellers in the beta regime. If it is determined that such operation is unsafe, the issue may be addressed by showing compliance with § 23.1155.

The nature of the regulatory requirement provided by § 23.1155 allows a subjective, qualitative evaluation for compliance determination. The intent is to prevent inadvertent operation in the beta mode, even if the possibility of inadvertent operation is remote. If an operation or feature of the design can allow in-flight, inadvertent placement of the control below the flight regime, the design does not comply with the regulation. In other words, the design should be evaluated considering the types of operations that will be seen in service. Consider items such as hardware wear modes or maintenance issues that may cause the control to be unintentionally placed or creep into the beta regime over time.

Intentional In-Flight Operation

On all future type certification projects, the Flight Manuals should include the appropriate operational limitations and consequence statement for in-flight beta operation.

Beta Lock-Out Systems

To add an assurance that in-flight beta will not occur, some airplanes have incorporated lock-out systems. These systems remove the ability to do this operation in-flight, even if intentionally commanded.

It is important to note that the installation of a beta lock-out system cannot be used instead of the design requirements of § 23.1155 compliance. Also, in some cases, propeller beta operation is used to show compliance with stopping distances in Part 23, Subpart B. Under Subpart B, when means other than wheel brakes are

used for determining stopping distances, the means must be "safe and reliable."

If beta operation is used to show compliance with stopping distances, the reliability of a system that would prevent in-flight beta operation must be such that this capability, when required, will be available to comply with Subpart B, and § 21.21(b)(2) or § 21.101(b). With a system safety analysis, the applicant can determine the required reliability level for the beta lock-out system based on the hazard level (for example, § 23.1309 compliance).

Therefore, for new type certificated airplanes that have a beta lock-out system incorporated or previously certificated airplanes that add a beta lock-out system, the applicant should perform a system safety analysis of the installation of this system. This analysis should consider hazards such as the inability to command beta on one engine on a multiengine airplane. For example, if beta is commanded on both engines during land roll-out, but only one propeller goes into beta mode, this might adversely affect ground controllability.

For further information about this policy, contact Mr. Randy Griffith, Federal Aviation Administration, Small Airplane Directorate, Regulations and Policy Branch, ACE-111, 901 Locust, Room 301, Kansas City, Missouri 64106; telephone (816) 329-4126; fax (816) 329-4090; email: randy.griffith@faa.gov.

Safety Shoes?

According to the European Union, the safest shoe for factory workers is the clog. Yup, that wooden shoe developed by the Dutch in medieval times.

Safety researchers in Europe found that the wooden clog is even safer than steel-toed work boots when it comes to withstanding compression, resisting impact and preventing nail penetration. They're also cool in the summer, warm in the winter and provide better water resistance. To top it off, clogs are cheap, costing about \$15 in Dutch hardware stores.

--Adapted from *Electrical Apparatus*

Compliance with the Engine Ingestion Requirements Applicable to Turbine Powered, 14 CFR Part 23, Normal, Utility, Acrobatic, and Commuter Category Airplanes

*Policy Statement Number
ACE-00-23.901(d)(2)*

The policy is applicable to turbine powered, normal, utility, acrobatic, and commuter category airplanes. This document advises the public, in particular, small airplane owners and modifiers, of more information related to compliance with the engine ingestion requirements applicable to turbine powered, Part 23, normal, utility, acrobatic, and commuter category airplanes.

Background

This notice announces the following policy statement, ACE-00-23.901(d)(2). The purpose of this statement is to address compliance with the engine ingestion requirements applicable to turbine powered, Part 23, normal, utility, acrobatic, and commuter category airplanes. The policy was published in the Federal Register on January 5, 2001 (66 FR 1182) after completing the public comment period.

What Is the General Effect of This Policy?

The FAA is presenting this information as a set of guidelines suitable for use. However, we do not intend that this policy set up a binding norm; it does not form a new regulation and the FAA would not apply or rely on it as a regulation.

The FAA Aircraft Certification Offices (ACO's) and Flight Standards District Offices (FSDO's) that certify changes in type design and approve alterations in normal, utility, and acrobatic category airplanes should try to follow this policy when appropriate. Applicants should expect the certificating officials would consider this information when making findings of compliance relevant to compliance with the engine ingestion requirements applicable to turbine powered, Part 23, normal, utility, acrobatic, and commuter category airplanes.

As with all advisory material, this statement of policy identifies one way, but not the only way, of showing compliance.

General Discussion of Comments

We issued a notice of policy statement, request for comments, which the FEDERAL REGISTER published on September 1, 2000 (65 FR 53338). The public comment period closed October 2, 2000.

The Policy

Background

The current § 23.901(d)(2) requirement was incorporated by Amendment 23-53. However, the basic requirement, which has evolved into the current § 23.901(d)(2), was incorporated by Amendment 23-18.

Amendment 23-18 required that the engine installation provide continued engine operation without a sustained loss of power when operated at flight idle in rain for at least three minutes. The rate of rain ingestion was to be not less than 4 percent, by weight, of the engine induction airflow rate. The rule was incorporated due to reports of turbine engine power loss while operating in heavy rain. The intent of the rule was twofold:

(1) to ensure that installation effects do not result in deterioration of the engine's rain ingestion tolerance determined by engine certification; and

(2) to evaluate the engine's capability for rain ingestion for engines that were certificated before Amendment 33-6 since rain ingestion requirements were not added to 14 CFR Part 33 until Amendment 33-6. Therefore, the rate of rain ingestion to be considered was based upon the Part 33 engine certification requirement at the time.

Revisions of Standards

Amendment 23-29 revised the requirement to consider rated takeoff power/thrust. Also, the preamble to Amendment 23-29 further defined the intent of § 23.901(d)(2) by specifically stating that the rule is to ensure that installation effects do not result in any deterioration of the powerplant rain ingestion tolerance. Therefore, compliance with § 23.901(d)(2) required a separate determination for engine installation other than the requirements addressed by Part 33 (for example, engine certification without further installation certification is inadequate to demonstrate compliance with the Part 23 requirement).

Amendment 23-43 added a requirement that the installation be evaluated at the maximum installed power/thrust for takeoff. This new requirement was due to engine installations where rated takeoff power could be less than installed takeoff power; for example, de-rate thrust. The amendment also added a requirement that the engine be accelerated and decelerated safely under the rain conditions; however, Amendment 23-51 removed this consideration.

Amendment 23-53 added the current rule. The current amendment requires the installed engine to withstand ingestion of rain, hail, ice, and birds at a level not less than that established under engine certification. The significant changes with the new rule include operating concerns other than loss of power (for example, engine surges), the addition of hail, ice, and bird ingestion requirements, and replacement of specific rain quantification with the conditions used during engine certification. Under Amendment 23-53,

the airplane applicant needs to evaluate the conditions used to address rain, hail, ice, and bird ingestion during engine certification and how the installation relates to these conditions.

Means of Compliance

When showing compliance with the rain ingestion requirements for all amendment levels of § 23.901(d)(2), compliance is typically accomplished with design analysis that identifies areas of concern and test when there are areas of concern. Part 33 engine certification testing may be used for compliance if the engine certification testing

(1) addressed the areas of concern identified by the installation design analysis (for example, use of an installation representative test inlet system) and

(2) specific conditions addressed in the rule were addressed during engine certification testing. For airplanes with a certification basis prior to Amendment 23-53, test is typically required if the specific operating considerations contained in the Part 23 rule were not addressed during engine certification.

When evaluating areas of concern with the installation, consider areas where water pooling with subsequent ingestion or shed of localized "slugs" of water normally not addressed during engine certification might occur. Some examples are inlet system channels, indentations, and so forth. These are typical of turbopropeller or S-duct type inlets that have complex geometry to allow water pooling. This consideration is usually not a concern with simple pitot style inlets typical of

most Part 23 turbofan/turbojet engine installations. However, due to the large diversity of turbine engine installations in Part 23 airplanes, all installations should be evaluated to determine if areas of concern exist. For example, there are turbofan installations that use S-style inlet ducts that may have areas of concern.

Therefore, Part 23 turbine engine installations typically require testing since the vast majority of these are turbopropeller installations. However, if design analysis shows that the installation will not affect the water ingestion characteristics (for example, a simple and typical pitot style inlet installation) and engine certification addressed the specific conditions addressed in the Part 23 rule, this analysis combined with engine certification testing may be adequate to demonstrate rain ingestion compliance.

Also, since the rain ingestion requirements in Part 33 were not added until Amendment 33-6, the airplane applicant needs to evaluate the engine's certification basis to determine if the engine has been subjected to Part 33 rain ingestion testing. If the engine does not have Amendment 33-6 or a subsequent amendment as part of the certification basis, in accordance with § 23.903(a)(2)(iii), the engine must have a safe service history of rain ingestion in similar installations.

If it is determined that testing for rain ingestion should be performed, flight test is not required. The intent of the Part 23 rule is to ensure that the engine installation has not deteriorated the rain ingestion tolerance of the certificated engine. Since a ground static engine test normally demonstrates engine certification compliance, use of installation ground

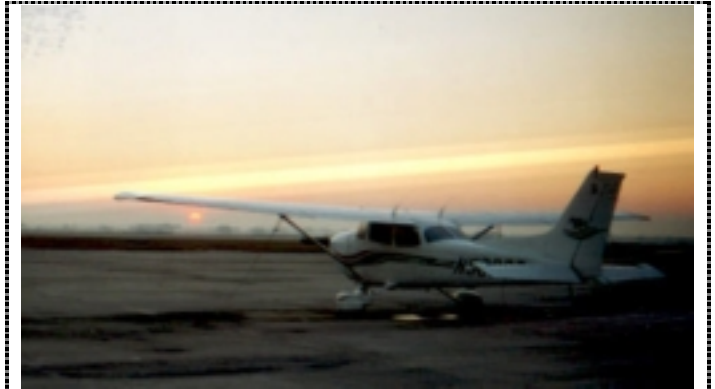
tests at the required power/thrust settings has been commonly accepted as a means of compliance.

The applicant can use design analysis to determine critical configurations and conditions of the installation. This might reduce required installation tests to the critical configurations and conditions instead of repeating the entire Part 33 test conditions. Engine certification should address the results of the critical point analysis for the engine; therefore, it is important for the engine installer to research the conditions and requirements used for engine certification.

Other Considerations for Compliance

Amendment 23-53 also added requirements for ice, hail, and birds. Examples of installation issues normally not addressed by engine certification, but that should be addressed for installation compliance, include the following: ice build-up on areas where ice shed may be ingested by the engines (for example, ice shed from wings and airframe sources into aft mounted engines) and consideration of items such as inlet splitters, acoustic liners, and so forth, that may be damaged by impact with ice, hail, and birds.

For further information about this policy, contact Mr. Randy Griffith, Federal Aviation Administration, Small Airplane Directorate, Regulations and Policy Branch, ACE-111, 901 Locust, Room 301, Kansas City, Missouri 64106; telephone (816) 329-4126; fax (816) 329-4090; email: randy.griffith@faa.gov.



A Cessna 172 waits for sunrise and an early departure.

Methods of Approval of Retrofit Shoulder Harness Installations in Small Airplanes

Policy Statement Number ACE-00-23.561-01

The subject policy is applicable to modifying small airplanes. After completing the public comment period, the policy was published in the Federal Register on September 28, 2000 (65 FR 58307). The document advises the public, in particular, small airplane owners and modifiers, of more information related to acceptable methods of approval of retrofit shoulder harness installations.

Background

The purpose of the statement is to address methods of approval for retrofit shoulder harness installations in small airplanes.

What is the general effect of the policy?

The FAA is presenting the information as a set of guidelines suitable for use. However, we do not intend that this policy set up a binding norm; it does not form a new

regulation and the FAA would not apply or rely on it as a regulation.

The FAA Aircraft Certification Offices (ACO's) and Flight Standards District Offices (FSDO's) that certify changes in type design and approve alterations in normal, utility, and acrobatic category airplanes should try to follow this policy when appropriate. Applicants should expect the certificating officials would consider this information when making findings of compliance relevant to retrofit shoulder harness installations.

As with all advisory material, the statement of policy identifies one way, but not the only way, of showing compliance.

General Statement of Policy

Summary

A retrofit shoulder harness installation in a small airplane may receive approval by Supplemental Type Certificate (STC), Field Approval, or as a minor change. An STC is the most rigorous means of approval and offers the highest assurance the installation meets all the airworthiness regulations. A Field Approval is a suitable method of approval for a shoulder harness installation that needs little or no engineering. Shoulder harness installations may receive approval as a minor change in certain cases. In such cases, the FAA certificated mechanic who installs the shoulder harness records it as a minor change by making an entry in the maintenance log of the airplane.

The FAA does not encourage the approval of retrofit shoulder harness installations as minor changes. The preferred methods of approval are Supplemental Type Certificate or Field Approval. However, the

FAA should not forbid the approval of a retrofit shoulder harness installation as a minor change in:

- the **front seats** of those **small airplanes manufactured before July 19, 1978**, and
- in **other seats** of those **small airplanes manufactured before December 13, 1986**.

A retrofit shoulder harness installation may receive approval as a minor change in these small airplanes if:

- The installation requires no change of the structure (such as welding or drilling holes).
- The certification basis of the airplane is 14 CFR Part 23 before Amendment 23-20, Part 3 of the Civil Air Regulations, or a predecessor regulation.

In addition, a minor change installation should follow the guidance for hardware, restraint angles, and attachment locations provided in:

- Advisory Circular (AC) 43.13-2A, Acceptable Methods, Techniques, and Practices Aircraft Alterations.
- AC 21-34, Shoulder Harness - Safety Installations.
- AC 23-4, Static Strength Substantiation of Attachment Points for Occupant Restraint System Installations.

Installations approved as a minor change may not provide the occupant with the protection required by regulation (Civil Air Regulation (CAR) 3.386 or 14 CFR Part 23, § 23.561). However, a properly installed retrofit shoulder harness installation is a safety improvement over occupant restraint by seat belt alone.

Introduction

In January 1997, the Anchorage Aircraft Certification Office (ACO) Manager requested the Small Airplane Directorate to study the issue of retrofit shoulder harness installations in small airplanes. The Anchorage ACO specifically requested guidance for a Supplemental Type Certificate (STC) project to install shoulder harnesses in Piper PA-18 series airplanes. Shoulder harnesses are approved under Technical Standard Order (TSO)-C114 Torso Restraint Systems, or by other acceptable means appropriate to the certification basis of the airplane in which they will be installed. The policy statement addresses the approval of the shoulder harness installation only.

During 1998, the Small Airplane Directorate took part in the Aviation Safety Program to increase the use and effectiveness of occupant restraint systems in general aviation airplanes. This program supports the occupant survivability element of the Administrator's Safety Agenda for general aviation. The FAA has a goal of significantly reducing the number of fatal accidents over a ten-year period. Most of the content of this policy was presented in a paper at the August 19, 1998, meeting of this Aviation Safety Program.

The Manager of the Aircraft Maintenance Division of Flight Standards, AFS-300, has reviewed and agrees with this policy.

General Discussion of Comments

Has FAA taken any action to this point?

We issued a notice of policy statement, request for comments. This proposed

policy appeared in the *Federal Register* on June 14, 2000 (65 FR 37449) and the public comment period closed July 14, 2000.

Was the public invited to comment?

The FAA encouraged interested people to join in making this proposed policy. We received comments from 12 different commenters. Commenters included pilots, operators, individuals, manufacturers, and organizations representing these groups. Most of the commenters were supportive of the proposed policy.

Commenters praised the proposed policy for promoting safety, especially on older airplanes. We will discuss the general comments and concerns then we will discuss comments that are more specific.

General and Miscellaneous Comments

One individual wrote, "I would like to give my support to the opportunity for minor changes to allow shoulder harness installations in older aircraft." Another commenter noted, "This is indicative of a long overdue recognition that better is the enemy of the good, and people need to make these reasonable improvements even if they cannot be of the standard of current regulations for new aircraft. Well done!" A commenter representing an organization wrote that they had the policy memorandum proposal on retrofit shoulder harness on small airplanes and agree.

Mandatory Harness Requirement

A pilot wrote, "Having actually been in an aircraft crash situation, I feel quite strongly that shoulder harnesses in all

aircraft seating positions should be mandatory."

Removing many of the barriers associated with installing retrofit shoulder harnesses will allow owners of older aircraft to have them installed in their aircraft. With the removal of these barriers, it is not necessary to place an additional regulatory burden on aircraft owners. The policy statement does not form a new regulation and the FAA will not apply or rely on it as a regulation.

Acceptable Harnesses for Minor Change Installations

An operator and pilot commented, "Many of the racing industries commonly available four and five point safety harnesses are tested to standards and loads that easily exceed the FAA's 1,500 pound failure limit load. These very affordable harnesses, much less expensive shoulder and lap harnesses could be easily installed with over the counter hardware aviation hardware and would be a highly positive safety enhancement." Similarly, a manufacturer wrote that minor change installations of retrofit shoulder harnesses should include those produced under a Parts Manufacturer Approval (PMA), harnesses that meet military specification requirements, and harnesses that meet Society of America Engineers aircraft restraint system requirements.

We agree that removing many of the barriers associated with the installation of retrofit shoulder harnesses will allow owners of certain small aircraft to increase the level of safety in their aircraft. We also agree that we should allow minor change installations that use non-TSO-C114 harnesses. However, apart from TSO-C114

harnesses, we will accept only those harnesses that meet the Society of Automotive Engineers Aerospace Standard 8043, harnesses produced under a Parts Manufacturer Approval (PMA) or harnesses that meet military specification requirements. We have revised the policy statement to include these other harnesses.

Attachments to Unsupported Tubes

The same manufacturer also suggested that:

- FAA allow attachments to unsupported tube elements as minor changes;

- the unsupported tube issue needs more study;

- companion guidance material to the retrofit shoulder harness policy statement should address restraint attachment points; and

- FAA develop guidance regarding replacement and maintenance of existing seat belts and shoulder harness installations.

We disagree. The FAA will study this suggestion in further detail but we are unwilling to change existing guidance on methods of attachment. We agree that we should develop companion guidance that addresses the restraint points and replacement and maintenance.

Level of Safety, Attachment Methods, and Material Variability

A second manufacturer wrote concerning the policy that we address:

-appropriate attachment methods in the policy,

-production material variability, and

-improper installation and attachment.

We agree with these comments and address them in the policy statement.

This manufacturer also wants to see the policy address the loading, level of safety, head impact injury criteria, and strength requirements of 14 CFR Part 23, § 23.561.

The FAA disagrees. Installation of shoulder harnesses may be accomplished without FAA approval if the installation is a minor change to the airplane design. If the installation is a major change, a Supplemental Type Certificate or Field Approval must be obtained.

For aircraft type certificated before the effective date of Amendment 23-20, the shoulder harness need not meet the requirements of 14 CFR § 23.561, and its predecessor regulations, if the installation of the harness is not essential to the operation of the airplane. A shoulder harness installed as a minor change does not have to provide the level of safety required in 14 CFR § 23.561. The head impact injury criteria and strength requirements of the harness, including fitting factors, do not have to be met for minor change installations.

THE POLICY

References

1. Advisory Circular (AC) 21-34, Shoulder Harness—Safety Belt Installations, June 4, 1993.
2. AC 23-4, Static Strength Substantiation of Attachment Points for Occupant Restraint System Installations, June 20, 1986.
3. AC 43.13-2A, Acceptable Methods, Techniques, and Practices—Aircraft Alterations, Revised 1977.
4. Order 8300.10, Airworthiness Inspector's Handbook, Change 12, December 14, 1999, Volume II.
5. Technical Standard Order (TSO)-C114, Torso Restraint Systems, March 27, 1987.
6. Technical Standard Order C-22f, Safety Belts, May 1, 1972.

Discussion

What are the Requirements?

1. Front seat shoulder harnesses required. Section 23.785 of 14 CFR Part 23 as amended by Amendment 23-19 effective July 18, 1977, required all normal, utility, and acrobatic category airplanes for which **application for type certificate was made on or after July 18, 1977**, to have an approved shoulder harness for each front seat. Section 91.205(b)(14) requires all small civil airplanes **manufactured after July 18, 1978**, to have an approved shoulder harness for each front seat. The shoulder harness must be designed to

protect the occupant from serious head injury when the occupant experiences the ultimate inertia forces specified in § 23.561(b)(2). The inertia force requirements are discussed in paragraph 3 below.

2. Shoulder harnesses required at all seats. Section 91.205(b)(16) requires all normal, utility, and acrobatic category airplanes with a seating configuration of 9 or less, excluding pilot seats, **manufactured after December 12, 1986**, to have a shoulder harness, for forward-facing and aft-facing seats, that meets the requirements of § 23.785(g) [which requires that the occupant be protected from the ultimate inertia forces specified in § 23.561(b)(2)]. Section 23.785(g) also provides: "For other seat orientations, the seat and restraint means must be designed to provide a level of occupant protection equivalent to that provided for forward and aft-facing seats with safety belts and shoulder harnesses installed." The above Part 91 operating rule stems from § 23.2, Special retroactive requirements, Amendment 23-32, effective December 12, 1985.

3. Belts or harnesses provided for in the design. Civil Air Regulation (CAR) 3.386 and Part 23, § 23.561, Amendments 23-0 through 23-34, effective February 17, 1987, require occupant protection from serious injury during a minor crash landing when "proper use is made of belts **or** harnesses provided for in the design," when the occupants are subjected to the following ultimate inertia forces:

	<i>Normal & Utility Category</i>	<i>Acrobatic Category</i>
Forward	9.0g	9.0g
Sideward	1.5g	1.5g
Upward	3.0g	4.5g

With Amendment 23-36, effective September 14, 1988, the text of § 23.561 quoted above was changed to read: "proper use is made of seats, safety belts, and shoulder harnesses provided for in the design." Section 23.785(b) was also changed to read:

"Each forward-facing or aft-facing seat/restraint system in normal, utility, or acrobatic category airplanes must consist of a seat, safety belt, and shoulder harness that are designed to provide the occupant protection provisions required in § 23.562 of this part. Other seat orientations must provide the same level of occupant protection as a forward-facing or aft-facing seat with a safety belt and shoulder harness, and provide the protection provisions of § 23.562 of this part."

The emergency landing ultimate inertia load factors have remained unchanged from Amendment 23-36 through Amendment 23-52, effective April 30, 1998. Amendment 23-52 is the latest amendment level to Part 23.

For inertia force requirements for occupant protection preceding CAR 3, refer to Table 1 in AC 21-34, which lists the requirements for the regulations dating from Bulletin 7-A to the original Part 23.

What are the methods of approval for retrofit shoulder harness installations?

1. Supplemental Type Certificate (STC).

An STC is the most desirable and most rigorous approval. The STC offers the highest assurance that all of the airworthiness regulations have been met. The STC approvals are issued by the FAA Aircraft Certification Offices (ACO's). STC approvals are usually obtained by a shoulder harness installation kit supplier for multiple airplane installations in an airplane model or model series.

AC's 21-34 and 23-4 (References 1 and 2) provide guidance and acceptable means of compliance for shoulder harness and seat belt installations. AC 23-4 specifically addresses Part 23 installations. These AC's are also applicable to installations in airplanes having a certification basis of predecessor regulations (for example, CAR 3).

An applicant for an STC may use a salvaged airplane fuselage to substantiate the strength of the fuselage and the shoulder harness attachment fittings by structural tests, since the shoulder harness attachment structural test may damage an airworthy fuselage. It may be a problem that the available test airframe may be stronger than the lowest strength production airframe. This may be a problem in steel tube airframes.

During many years of producing such airframes, various specification materials may have been used. For example, many CAR 3 (and predecessor regulations) airplanes were originally produced from 1025 steel tubing and later constructed from higher strength 4130 steel. In one case studied, two different specification 1025 steel tubings were used which may

have an ultimate tensile strength (UTS) ranging from 55,000 to 79,000 pounds per square inch (psi). The UTS for 4130 steel is 90,000 to 95,000 psi.

The test article should be representative of the lowest strength production airframe. This may be accomplished by a conformity inspection using the production drawings. The strength of materials of parts affected by the modification needs to be verified by the airframe manufacturer's process and production records. The serial number of the test article needs to be verified.

An alternative course of action would be to determine, by appropriate tests (for example, chemical analysis, hardness tests, strength tests), the strength of the parts of the test article affected by the modification. Follow with testing to a conservatively higher load that accounts for the difference in strengths of the test article and the lowest strength production article. Determination of the higher applied test load should take into account any uncertainty in the test(s) used to determine the strength of the material.

Another alternative course of action may be to conduct the harness pull test on the available test airframe. The applicant may then substantiate the strength of other tubing specifications by a combination of test results and analysis.

AC 23-4 provides an acceptable means of compliance for static strength substantiation of attachment points for occupant restraint system installations. A test block is described to apply the 9.0-g forward inertia load. The safety belt installation alone is tested to 100 percent of the load. The shoulder and safety belt combined load is distributed 40 percent to

the shoulder harness and 60 percent to the seat belt.

In airplanes having side-by-side seats, the pull test may need to be applied simultaneously to the harness fittings for both seats. However, this depends on the type of harness and where the upper ends are anchored. Normally, this would not be necessary for a single diagonal belt shoulder harness attached to the outboard fuselage side or wing spar root end.

In the case of a pull test for a retrofit shoulder harness installation in the tandem seated tubular steel PA-18 fuselage, the forward inertia load was applied simultaneously for both harnesses. This was done for convenience in applying and reacting the loads. It was found, that due to the tube geometry, the load at the aft harness attachment caused a tension in the rear spar carrythrough tube. The front seat shoulder harness upper end was attached to the rear spar carrythrough tube. This enabled the front seat harness attachment to test to a higher load than if the pull test was done to each harness individually. In such a case, the test loads for each harness should be done individually.

Part 21, § 21.50(b) requires the holder of an STC to furnish Instructions for Continued Airworthiness, prepared in accordance with § 23.1529.

An STC can not be used to modify an aircraft without the permission of the STC holder. FAA Notice 8110.69 dated June 30, 1997, requires the STC holder to provide the customer (installer or airplane owner) with a signed permission statement that includes the following:

- product (aircraft, engine, propeller, or appliance) to be altered, including serial number of the product;

- the STC number; and

- the person(s) who is being given consent to use the STC.

The permission statement needs to be kept as part of the aircraft records. The requirement for this permission statement originated in the Federal Aviation Authorization Act of 1996 (Public Law 104-264). This provision was put into law to try to stop the pirating of STC's.

2. Field Approval. A shoulder harness installation in a small airplane may receive a Field Approval (FAA Form 337) granted by a Flight Standards Aviation Safety Inspector. Field Approvals are appropriate for alterations that involve little or no engineering. If the installation requires structural modifications, an Aircraft Certification Office will need to assist in the Field Approval process by approving the structural aspects of the installation. A Field Approval constitutes a change to type design and must meet the same regulatory requirements as an STC.

AC 43.13-2A (Reference 3) contains methods, techniques, and practices acceptable to the Administrator for use in altering civil aircraft. Chapter 9 covers shoulder harness installations. Section 3 covers attachment methods. Shoulder harnesses installed under Field Approval must meet the same regulatory requirements as an STC. Therefore, the applicant should demonstrate by test 9.0-g forward load capability. The test load should be 814 pounds for Normal Category or 910 pounds for Utility or

Acrobatic Category, in accordance with AC 23-4.

Reference 4, Chapter 1, Perform Field Approval of Major Repairs and Major Alterations, Section 1, paragraph 5.D(2) states: "Acceptable data that may be used on an individual basis to obtain approval are:

- AC's 43.13-1A and 43.13-2A, as amended*
- Manufacturer's technical information (for example, manuals, bulletins, kits, and so on)
- FAA Field Approvals."

* Note: Advisory Circular (AC) 43.13-1B, dated September 8, 1998, superseded AC 43.13-1A.

When using a previous Field Approval as acceptable data, the pull test need not be done if it can be determined that a previous pull test applied 814 pounds for Normal Category or 910 pounds for Utility or Acrobatic Category. Field Approvals for shoulder harness installations should not be done by referencing a previous Field Approval and deleting the pull test, unless the attachment parts have a Parts Manufacturer Approval (PMA), or other FAA approval. If the attachment parts have no FAA approval, the strength is not known or assured, since they have not been manufactured to an FAA approved quality control system.

Shoulder harness installations attaching to the center of an unsupported wing carrythrough tube, or other unsupported member, should not receive a Field Approval without a design approval from an Aircraft Certification Office. Applying

the test load in such cases may cause damage or permanent set to the affected structure.

Existing FAA guidance, including AC 43.13-2A and AC 21-34, recommend against attachment to the center of unsupported members. Figure 9-16 in AC 43.13-2A shows typical shoulder harness attachments to tubular members. These are all at tube intersections and not at the center of unsupported tubes.

Figure 9-12 shows a typical wing carrythrough member installation. This appears to be in the center of the carrythrough member that is a hat section as found in metal skinned airplanes. Part of the figure shows that the hat section is riveted to sheet metal skin (which would provide longitudinal support).

Personnel performing the Field Approval must ensure that both the harness and belt are compatible and have a TSO approval.

Flight Standards Information Bulletin for Airworthiness (FSAW) 98-03, dated January 30, 1998, (Reference 4) requires that a Field Approval include Instructions for Continued Airworthiness prepared (in the case of Part 23 airplanes) under § 23.1529. The Instructions will be documented on FAA Form 337, and become a part of either the inspection or maintenance program of the aircraft, or both.

3. Minor change. Part 21, § 21.93(a), Classification of changes in type design, states: "A minor change is one that has no appreciable effect on the weight, balance, structural strength, reliability, operational characteristics, or other

characteristics affecting the airworthiness of the product."

Information provided to us by the Anchorage ACO indicates that some shoulder harness installations, that provide known safety improvements, have been approved as a minor change. In these situations, the FAA certificated mechanic who installs it makes an entry in the maintenance log of the airplane.

One shoulder harness installation kit supplier uses this process (no FAA approvals) to install shoulder harnesses in PA-18 airplanes. The installation does not require modification of the airframe. The front seat harness attaches to the center of the rear wing spar carrythrough tube. However, it may not meet the 9.0-g forward inertia load required by CAR 3.386. The kit supplier stated that some airplane owners who had accidents reported that the harness installation had saved their lives.

In general, shoulder harness installations should not use the center of an unsupported wing carrythrough tube or other unsupported member as an attachment point. This type of attachment may pose a risk to the structural integrity of the airplane. Although the attachment may be a clamp-on fitting that does not alter the existing airframe, the installation may result in a major change in the type design. This is because the shoulder harness attachment may introduce new loading conditions into the carrythrough tube.

It is acceptable for the carrythrough structure to be damaged in an emergency landing. However, it is unacceptable for the tube to fail in-flight. Carrythrough tubes, highly loaded in compression, may

experience a beam-column buckling failure if the occupant applies a load to the shoulder harness attachment. In some cases, very small loads on the shoulder harness attachment may cause beam-column buckling failures.

Some shoulder harnesses that have been installed by minor change do not have a TSO approval. TSO-C114, Torso Restraint Systems, was issued March 27, 1987. Torso restraint systems manufactured before that date did not have to meet the prescribed Society of Automotive Engineers standard, Aerospace Standard 8043, Aircraft Torso Restraint System, dated March 1986. AC 43.13-2A and AC 21-34 provide guidance for acceptable harnesses. Acceptable harnesses for minor change installations include:

- harnesses that meet TSO-C114 or Military Specification (MIL-SPEC) requirements,

- harnesses that have been produced under a Parts Manufacturer Approval (PMA), or

- other harnesses appropriate to the certification basis of the aircraft.

We have studied the circumstances and legality of shoulder harness installations done by minor change. An airplane owner may wish to install shoulder harnesses, but an STC or prior Field Approval is not available for his airplane. In this case, it is not likely that an individual airplane owner would apply for an STC or a Field Approval. This is because of the costs involved in hiring an engineering consultant to perform the structural test and any associated structural analysis. Also, there is a possibility that the airframe may be damaged during the pull

test. In such installations, a pull test would not be done and there is no assurance that the installation will provide occupant protection to the ultimate inertia force requirements (particularly the 9.0-g forward force) of § 23.561 or CAR 3.386.

Concerning the legality of shoulder harness installation by minor change, we conclude: Since CAR 3.386 and § 23.561(b)(1) before Amendment 23-36 (which became effective September 14, 1988) state that "proper use is made of belts or harnesses provided in the design," the previously approved seat belt installation alone must meet the prescribed ultimate inertia forces.

Civil Air Regulation 3.652, Functional and installational requirements, states: "Each item of equipment which is **essential to the safe operation of the airplane** shall be found by the Administrator to perform adequately the functions for which it is to be used, shall function properly when installed, and shall be adequately labeled as to its identification, function, operational limitations, or any combination of these, whichever is applicable."

Before Amendment 23-20 (which became effective September 1, 1977), § 23.1301 contained essentially the same requirement as CAR 3.652. Amendment 23-20 deleted the words "essential to safe operation" and made the provisions of § 23.1301 applicable to "each item of installed equipment."

Regarding these rules we conclude that if a shoulder harness is not required equipment, it is not essential to the safe operation of the airplane. Therefore, CAR 3.652 and § 23.1301, before Amendment 23-20, should not be used as a basis to

prohibit shoulder harness installation by minor change. These rules should be applied to shoulder harness installations made by STC and Field Approval.

The mechanic making such installations should consult AC 43.13-2A, Chapter 9, for information on restraint systems, effective restraint angles, attachment methods, and other details of installation.

For further information about this policy statement contact Michael Reyer, Federal Aviation Administration, Small Airplane Directorate, ACE-111, Room 301, 901 Locust, Kansas City, Missouri 64106; telephone (816) 329-4131; fax 816-329-4090; e-mail: michael.reyer@faa.gov.



**Diamond Aircraft Industries (DAI)
Model DA-40**

The FAA is currently conducting a validation certification project on this aircraft. DAI has requested FAA certification for an Instrument Flight Rules version of the DA-40. DAI has obtained a Joint Aviation Authorities type certificate for a Visual Flight Rules version of the DA-40.

Airworthiness Directives Now Easier Reading

by Scott Wessley

Although FAA Designees do not have the authority to sign off airworthiness directives (AD's), they could be called on periodically to interpret AD's or coordinate questions with the FAA. For this reason, we thought it would be helpful to include a regular column about AD's.

This issue discusses some of the recent format changes to improve the readability of AD's.

What was the need to change the format of AD's?

Part of the presidential administration's plan to make government more efficient is to communicate more responsively and effectively with the public using plain language. We carried out this plain language initiative in writing the Small Airplane Directorate AD's.

What are the specific changes?

The content in the AD's is the same. We are presenting the information differently. The following presents the basic format and writing changes:

- a question and answer format allows the reader to scan the document and find the specific information he or she is looking for; and

- a chart format for the requirements of the AD allows the mechanic to take the chart in the AD and the service information and carry out the AD (the rest of the document is background information in case specific questions arise).

How does FAA know that these changes are effective in communicating with the public?

The specific format changes we set up were based on the following:

- comments received on notice of proposed rulemakings (NPRM's);

- feedback received from mechanics based on sample formats we developed; and

- continuing feedback received from FAA project officers and field personnel.

We have changed, and continue to be willing to change, our formats based on the identified needs of our customers.

How can I present ideas for future consideration?

To send any AD format ideas, subjects for future newsletter discussion, or any other AD aspects, please write to:

Federal Aviation Administration
Small Airplane Directorate
Attention: AD Processing Staff
901 Locust, Room 301
Kansas City, Missouri 64106

You can also fax your questions to (816) 329-4149; or E-mail the Small Airplane Directorate AD staff at:

"scott.wessley@faa.gov";
"bill.marshall@faa.gov"; or
"larry.werth@faa.gov".

How do I access specific AD's through the Internet?

You can find recent AD's on the Internet using these steps:

1. Go to site "<http://AFS600.faa.gov>".
2. Click on AFS610 under "Search" on the far left.
3. Click on Airworthiness Directives.
4. Make your selection from the list of options.

If you are looking for an older AD and it does not show up on this Internet site, you can contact the FAA at the above address, facsimile number, and e:mail addresses.

"Approval" of Service Bulletins

There has been some confusion in the field concerning Service Bulletins marked "FAA Approved." Aircraft owners and operators sometimes believe that they have to comply with documents marked "FAA-Approved." This is not the case. Unless an Airworthiness Directive (AD) is issued mandating a service bulletin, the service bulletin is not considered mandatory by the FAA.

FAA Order 8110.37C encourages the DER to approve the engineering aspects of a manufacturer's service documents; however, the statement attesting to this on the service document should not be misleading. An appropriate statement on a service bulletin should be similar to: "Only the technical contents of this Service Bulletin are approved."

Service documents that are made a part of, or referenced in an AD must be approved by the ACO. Since the Airworthiness Limitations Section of the Instructions for Continued Airworthiness is FAA-Approved, any changes to that section after its original FAA approval may only be accomplished by Airworthiness Directive actions.

Similarly, some service documents contain references implying that a service bulletin is considered an amendment to the manufacturer's service/maintenance manual or Instructions for Continued Airworthiness (ICA). Consequently, the service bulletin must be accomplished for ongoing airworthiness compliance, as required per 14 CFR Part 43, § 43.13. This again promotes the wrong impression in the field. The service bulletin or letter may indeed amend a maintenance manual or ICA; however, FAA policy is that the change is not mandatory for aircraft manufactured previous to its date of issue unless mandated by an AD. The FAA does not permit a pre-determination that compliance with some future document is mandatory.

**Small Airplane Directorate
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Telephone Directory

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Belleville, MI 48111

COMMERCIAL NUMBER: (734) 487-7232
FAX NUMBER: (734) 487-7429

DETROIT MANUFACTURING INSPECTION SATELLITE OFFICE		NUMBER
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Aviation Safety Inspector	Arthur Nadobny	(734)487-7232
Aviation Safety Inspector	Craig Justus	487-7364
Aviation Safety Inspector	James Pratt	487-7396

VANDALIA MANUFACTURING INSPECTION DISTRICT OFFICE

3800 Wright Drive
Vandalia, OH 45377

COMMERCIAL NUMBER: (937) 898-3991
FAX NUMBER: (937) 898-8717

VANDALIA MANUFACTURING INSPECTION DISTRICT OFFICE		NUMBER
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MANAGER	David W. Schaer	(937) 898-3991
Aviation Assistant	Carolyn Sue Leach	898-3991
Senior Aviation Safety Inspector	Richard Warren	898-3991
Aviation Safety Inspector	Roger Deaton	898-3991
Aviation Safety Inspector	Jon Ingle	898-3991
Aviation Safety Inspector	Ronald Fosnot	898-3991
Aviation Safety Inspector	Mary K. Eldridge	898-3991

WICHITA MANUFACTURING INSPECTION DISTRICT OFFICE

Mid-Continent Airport
1801 Airport Road
Room 101
Wichita, KS 67209

COMMERCIAL NUMBER: (316) 946 + four-digit extension

FAX NUMBER: (316) 946-4452

WICHITA MANUFACTURING INSPECTION DISTRICT OFFICE

NUMBER

MANAGER	Doyle M. King, Jr.	(316) 946-4178
Aviation Assistant	Kerri L. Whitney	946-4175
Senior Aviation Safety Inspector	Dudley F. McHone	946-4180
Aviation Safety Inspector	Donna R. Basgall	946-4182
Aviation Safety Inspector	Vicki Gordon	946-4183
Aviation Safety Inspector	Robert Smith	946-4179
Aviation Safety Inspector	Cindy Ensminger	946-4181
Aviation Safety Inspector	Lois Abele	946-4187

KANSAS CITY MANUFACTURING INSPECTION DISTRICT OFFICE

901 Locust - Room 376
Kansas City, MO 64116

COMMERCIAL NUMBER: (816) 329-4190
FAX NUMBER: (816) 329-4195
CCMAIL: KCMIDO

KANSAS CITY MANUFACTURING INSPECTION DISTRICT OFFICE		NUMBER
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MANAGER	Jane Dorsey	(816)329-4189
Aviation Assistant	(Vacant)	329-4191
Aviation Safety Inspector	Gary L. Benson	329-4197
Aviation Safety Inspector	Tilak Nandipati	329-4192
Aviation Safety Inspector	Patricia Patch	329-4194
Aviation Safety Inspector	David Surguy	329-4193

**DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
CENTRAL REGION
FLIGHT STANDARDS DIVISION**

OFFICE ADDRESS: 901 Locust - Room 332
Kansas City, MO 64106

MAILING ADDRESS: 901 Locust - Room 332
Kansas City, MO 64106

COMMERCIAL NUMBER: (816) 329-3233

FAX NUMBER: (816) 329-3241

CCMAIL: MKCAEG-FSDO

AIRCRAFT EVALUATION GROUP, MKC AEG

MANAGER	Bill Mackey	(816) 329-3234
Secretary	Georganna Blakesley	329-3235
ASI (Airworthiness)	William N. Palmerton	329-3238
ASI (Airworthiness)	Jerry L. Garrison	329-3239
ASI (Operations)	Doug Edwards	329-3236
ASI (Operations)	Richard McCleish	329-3237
ASI (Operations)	C. Fred Beeman	329-3240

